

The Mining Living Library

Mining equipment that recognises itself, guides the work, and builds new mines — not a catalog of parts, but a colleague that knows the pit and plant.

50

EQUIPMENT CLASSES

350

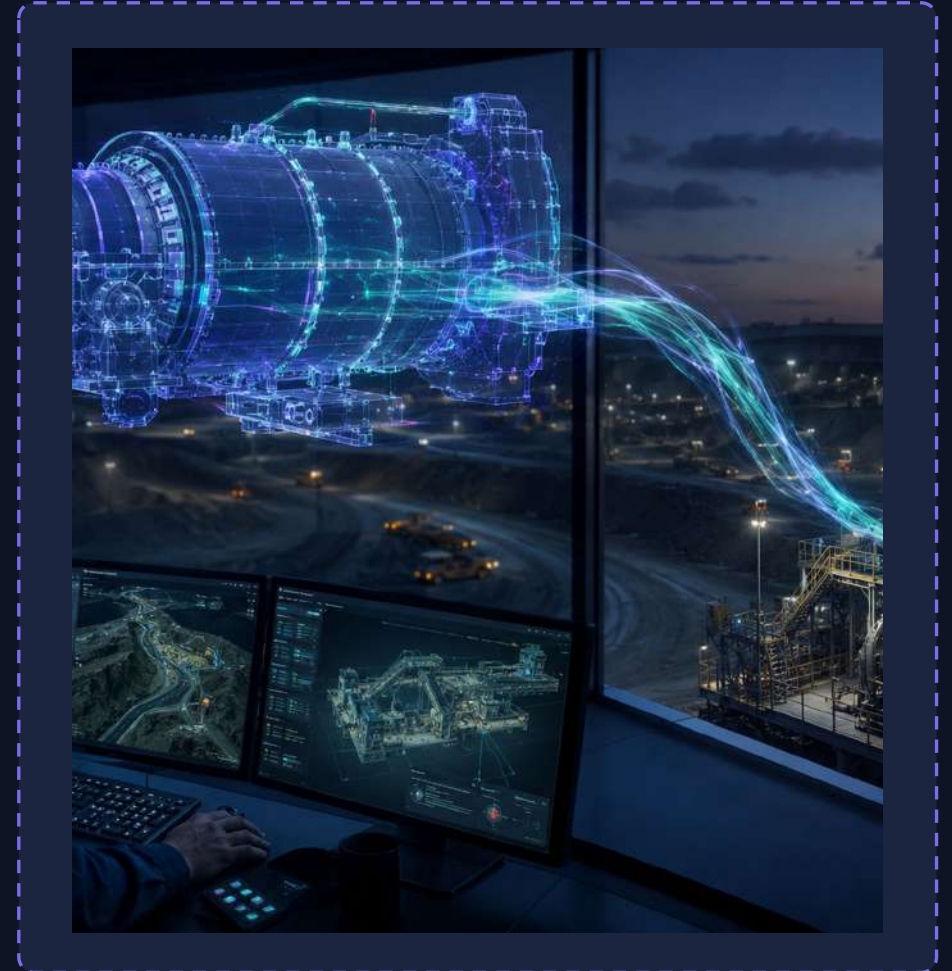
SUBCOMPONENTS

ISO 14224

MINE TAXONOMY
(+ISO 55000)

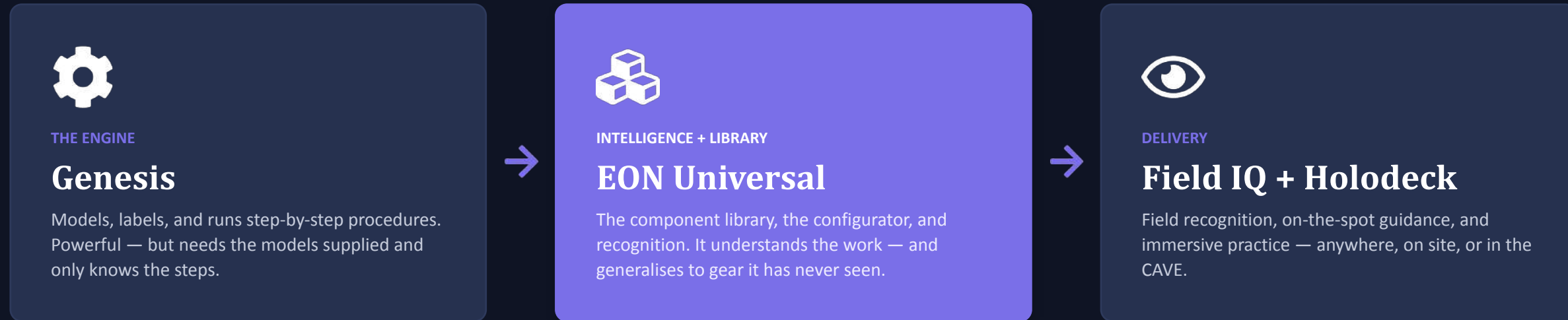
1st

OF A FAMILY OF
LIBRARIES



Where the library fits

EON Universal is a three-part platform. The library is its heart — the bounded vocabulary every facility is composed from.



This deck is the heart of it — the Work Intelligence Library: the finite vocabulary of understood components that Genesis runs, Universal composes, and Field IQ delivers in the field.

Genesis shows the steps. EON Universal understands the work.

WHAT MAKES IT DIFFERENT

A library that's alive

Other libraries store things. This one does the work — it recognises equipment, tells you what to do, and builds facilities from a vocabulary it understands.



Recognise

Names every component on sight and links the real machine to its digital twin. The green worker points; the library identifies.



Guide

Composes the correct procedure step by step — conditional SOPs that branch on live conditions, with safety gates that stop the line.



Build

Drags understood parts onto a canvas to compose any facility — unlimited, engineering-valid machines from one bounded library.

...and Escalate — when the library is unsure, it stops and hands off to a human. The worker is green; the guidance is not.

UNDER EVERY OBJECT — THE SIX-LAYER COMPETENCE RECORD

- 1 Identity
- 2 Geometry
- 3 Anatomy
- 4 Function
- 5 Behavior
- 6 Procedure

Recognition keys on layers 1–2. Guidance composes from layers 3–6. The knowledge is authored and owned — independent of any single AI model.

THE COMPARISON

Why the Universal Living Library is different

Shape, courseware, dynamics — every existing library stops short of the work.

	3-D / CAD library	LMS courseware	Process simulator	EON Work Intelligence Library
What it stores	A 3-D mesh or file	A course / SCORM module	A tuned plant model	A self-describing object: knowledge + 3-D twin
Knows how it works & fails	X	≈ generic theory	≈ dynamics only	✓ six authored layers
Understands isolation & relationships	X	X	≈ implicit	✓ explicit, per component
Tells you what to do — live	X	≈ passive content	X	✓ branching SOPs
Recognises real equipment on sight	X	X	X	✓ feeds FieldIQ + AR
Builds new facilities from it	X	X	X	✓ generative, valid
You own it — and it compounds	X vendor file	X vendor content	X one plant	✓ yours; better every job

Only the Work Intelligence Library binds understood work to the component, recognises it in the field, and lets you own it — the step nobody else has taken, not even a simulator.

ONE METHOD, EVERY HEAVY INDUSTRY

The first of a family

Because it understands components rather than memorising facilities, the same engine transfers to any industry built from a finite parts vocabulary. Learn the parts once; help every site built from them.



BUILT NOW

Petrochemical / Oil & Gas

ISO 14224 · 50 classes · 350 subcomponents



NEXT

Mining & Heavy Equipment

~40–60 core classes · same bounded method



ON THE MAP

Aerospace & MRO

High-regulation, high-value part taxonomy



ON THE MAP

Healthcare

Devices & equipment · same composition logic

Petrochemical is the proven, built library. *Adjacent verticals are illustrative of the roadmap — each follows the same bounded-vocabulary method, so every new industry compounds on the last.*

What's in the library

Fifty Level-1 classes in ten equipment families, seven Level-2 subcomponents each — mapped to ISO 14224 taxonomy principles under ISO 55000, the mine's own asset hierarchy.

Excavation & Loading

EX- DL- LD- LH- CM-

6

Haulage & Mobile Support

TR- AT- UT- GR- DZ- WC-

6

Drilling & Ground Support

DR- JD- RB- RBR- SH-

6

Crushing & Comminution

CR- ML- GR-

7

Material Handling & Conveying

FE- CV- SR- SC-

5

Separation & Concentration

FL- TH- CY- MS- SP- FP-

6

Slurry & Process Pumping

P-

4

Fixed Plant & Utilities

FN- AC- HPU- CN-

4

Electrical & Isolation

SW- MCC- TX- IS- VSD-

5

Instruments & Monitoring

WT-

1

The 350 subcomponents

Seven per class. But the same parts keep reappearing — so the library composes a small kit of understood primitives rather than enumerating 350 unique things.

350

7

~21

THE RECURRING PRIMITIVES · how many of the 350 contain each part-type



Composition over enumeration. Understand each primitive once — every assembly that uses it inherits the knowledge. These parts get generated next, the same Tripo way, as reusable 3D building blocks.

Subcomponents by family

All 350 Level-2 parts, grouped under their parent classes.

EXCAVATION & LOADING · 6

Hydraulic Mining Excavator

bucket, stick (dipper arm), boom, hydraulic cylinders, track undercarriage, slew ring & swing drive, operator cab

Electric Rope Shovel

dipper bucket, dipper handle, boom, hoist rope & drum, crowd machinery, swing drive & rack, crawler tracks

Walking Dragline

dragline bucket, drag ropes, hoist ropes, boom & mast, walking shoes (cams), tub base, swing & hoist machinery

Front-End Wheel Loader

bucket, lift arms, tilt linkage & cylinders, articulation joint, axles & differentials, tyres & rims, operator cab

Underground LHD Loader

bucket, boom & lift arms, articulation frame joint, hydraulic cylinders, diesel/electric powertrain, axles & wheel ends, operator compartment

Continuous Miner

cutter drum & picks, cutter head motor, gathering arms, conveyor (chain conveyor), crawler tracks, hydraulic system, stabilising jacks

HAULAGE & MOBILE SUPPORT · 6

Rigid-Frame Haul Truck

dump body (tray), hoist cylinders, wheel motors / final drives, tyres & rims, suspension struts, diesel engine, operator cab

Articulated Dump Truck

dump body, hoist cylinders, articulation & oscillation joint, transmission, drive axles, tyres, operator cab

Underground Haul Truck

dump body, hoist cylinder, articulation joint, powertrain & transmission, axles & wheel ends, tyres, operator cab

Motor Grader

moldboard blade, circle & drawbar, blade lift cylinders, articulation joint, tandem drive axles, scarifier/ripper, operator cab

Track Dozer

dozer blade, blade lift & tilt cylinders, push arms, ripper (rear), crawler track chains, track rollers & idlers, final drives

Water Cart / Dust-Suppression Truck

water tank, spray bars & nozzles, water pump, valve & manifold, truck chassis, tyres, cannon/monitor sprayer

Subcomponents by family

All 350 Level-2 parts, grouped under their parent classes.

DRILLING & GROUND SUPPORT · 6

Top-Hammer Surface Drill Rig

rock drill (hammer), feed beam, drill rods & couplings, drill bit, rotation motor, tracked carrier, dust collector

Down-the-Hole (DTH) Blasthole Rig

dth hammer, drill bit, drill pipe string, rotary head, feed mast, compressor, crawler carrier

Underground Jumbo Drill

drilling booms, rock drills (drifters), feed beams, drill rods & bits, articulated carrier, hydraulic power pack, operator platform

Roof Bolter / Rock-Bolting Rig

drill head & chuck, bolt feed/carousel, feed beam, boom, hydraulic system, resin/grout injector, tracked or wheeled carrier

Raise Borer

reaming head & cutters, drill string (rods), rotary drive head, thrust/pull cylinders, gripper/clamp, pilot bit, hydraulic power unit

Shotcrete Spraying Rig

spraying boom & nozzle, concrete pump, accelerator dosing pump, agitator hopper, hydraulic system, compressor, wheeled carrier

CRUSHING & COMMINATION · 7

Primary Gyratory Crusher

mantle, concave liners, main shaft, eccentric assembly, spider & spider cap, top shell & bottom shell, hydraulic adjustment cylinder

Jaw Crusher

fixed jaw plate, swing jaw plate, pitman, eccentric shaft, toggle plate, tension rod & spring, flywheel

Cone Crusher

mantle, bowl liner (concave), main shaft, eccentric bushing, countershaft & pinion, hydraulic adjustment ring, head/cone assembly

Mineral Sizer (Twin-Roll)

crushing rolls & teeth, roll shafts, gearboxes, drive motors, bearing assemblies, frame & housing, scraper bars

SAG Mill

mill shell, shell & head liners, trunnion bearings, ring gear & pinion, feed chute, discharge grate, lubrication system

Ball Mill

mill shell, rubber/steel liners, trunnion bearings, ring gear & pinion, feed & discharge trunnions, grate/diaphragm, grinding ball charge

High-Pressure Grinding Roll

fixed roll, floating roll, roll tyres/studs, hydraulic pressure system, bearing assemblies, feed hopper & gate, drive gearboxes

Subcomponents by family

All 350 Level-2 parts, grouped under their parent classes.

MATERIAL HANDLING & CONVEYING · 5

Vibrating Grizzly Feeder

feeder pan, grizzly bars, vibrating exciters/motors, support springs, liner plates, drive motor, frame

Apron Feeder

apron pans, crawler chains, drive sprockets & shaft, tail/take-up assembly, track rollers, hydraulic/gear drive, skirt boards

Belt Conveyor

conveyor belt, drive pulley, tail & bend pulleys, idler rollers, drive motor & gearbox, take-up unit, structure & frame

Stacker / Reclaimer

boom conveyor, bucket wheel, slew bearing, luffing cylinders/winch, travel bogies & rails, counterweight, drive motors

Vibrating Screen

screen decks, screen media (panels), exciter / vibrator motors, support springs, side plates, feed & discharge boxes, cross beams

SEPARATION & CONCENTRATION · 6

Flotation Cell

tank/cell body, rotor (impeller), stator, launder & froth lip, air sparging system, drive motor & shaft, level control dart valve

Thickener

tank, rake arms & blades, centre drive head, feedwell, overflow launder, underflow cone & outlet, lifting mechanism

Hydrocyclone

cylindrical feed chamber, conical section, vortex finder, spigot (apex), feed inlet, overflow outlet, wear liners

Magnetic Separator (Drum)

magnetic drum, stationary magnet array, drum shell, drive motor, tank/trough, feed box, scraper/discharge

Spiral Concentrator

helical trough, support column, feed distributor, product splitters, wash-water ports, launder/collection box, wear surface

Plate-and-Frame Filter Press

filter plates, filter cloths, hydraulic closing cylinder, head & follower plates, side bars, feed manifold, drip tray

SLURRY & PROCESS PUMPING · 4

Centrifugal Slurry Pump

impeller, volute casing & liners, shaft, bearing assembly, mechanical/gland seal, throatbush & frame plate liner, suction & discharge nozzles

Vertical Froth / Sump Pump

impeller, casing, column pipe & shaft, line bearings, sump/tank, drive motor, strainer/inlet

Subcomponents by family

All 350 Level-2 parts, grouped under their parent classes.

Peristaltic / Positive-Displacement Pump

hose/tube element, rotor & shoes (rollers), pump housing, gearbox & motor, lubricant fill, suction & discharge ports, leak detector

Process Water Pump

impeller, volute casing, shaft, bearing housing, mechanical seal, suction nozzle, discharge nozzle

FIXED PLANT & UTILITIES · 4

Primary Ventilation Fan

impeller/rotor blades, fan casing, drive motor, main bearings, inlet cone & guide vanes, damper/diffuser, drive shaft & coupling

Industrial Air Compressor

airend (screw element), drive motor, oil separator tank, air/oil cooler, inlet valve & filter, minimum-pressure valve, control panel

Hydraulic Power Unit

hydraulic pump, electric motor, oil reservoir, valve manifold, filters, accumulator, cooler

Overhead Bridge Crane

bridge girders, hoist & drum, trolley, wire rope & hook block, long-travel end trucks, drive motors, festoon/cable system

ELECTRICAL & ISOLATION · 5

Medium-Voltage Switchgear

circuit breaker (vacuum), busbars, protection relays, current/voltage transformers, racking mechanism, earthing switch, cable termination chamber

Motor Control Centre

draw-out starter buckets, contactors, overload relays, molded-case breakers, vertical & horizontal busbars, control transformers, incomer section

Distribution Power Transformer

core & windings, tank, bushings (HV/LV), tap changer, conservator / oil expansion, radiators/cooling fins, buchholz & protection devices

Field Isolator / Disconnect Switch

switch contacts, operating handle, lock-off hasp, enclosure, incoming/outgoing terminals, auxiliary contacts, earth terminal

Variable-Speed Drive (VSD/VFD)

rectifier section, dc bus capacitors, igbt inverter modules, cooling fans / heatsink, control board, input/output reactors, line filter

INSTRUMENTS & MONITORING · 1

Conveyor Belt Weightometer

weigh idler frame, load cells, speed sensor (tacho), integrator/controller, calibration weights, junction box, mounting frame

From knowledge to a 3-D twin



THE PROMPT FORMULA

4 views STYLE + Subject + Camera line + Negative

cutaway CUTAWAY style + internals + Negative

Locked photoreal studio style on a neutral mid-grey background; the object stays identical across all four views — only the camera angle changes.

Filenames hydraulic_mining_excavator_front.png ... _cutaway.png

Lined up for batch upload and the EON Ready agent.

WHERE THE 250 PROMPTS LIVE

- ✓ On each class slide — its hero prompt — copy & hand off
- ✓ In each slide's notes — the full 5-view set + filenames
- ✓ In the Build Pack .xlsx — all 250, copy-paste, batch-ready

50 classes × 5 images = 250 — kept out of the slide body so the deck stays a presentation, not a wall of prompts.

EX-01

Hydraulic Mining Excavator

EXCAVATION & LOADING

Excavation & Loading Class 1 of 50

WHAT IT IS

Tracked machine that digs and loads rock with a hydraulic boom, stick and bucket.

SUBCOMPONENTS · LEVEL 2

- bucket
- boom
- track undercarriage
- operator cab
- stick (dipper arm)
- hydraulic cylinders
- slew ring & swing drive

CUTAWAY REVEALS

the boom and bucket cylinders, hydraulic pump and valve bank, slew bearing, swing drive gears and track final drives



EX-02

Electric Rope Shovel

EXCAVATION & LOADING

Excavation & Loading Class 2 of 50

WHAT IT IS

Large electric cable-driven shovel that scoops and loads broken rock into haul trucks.

SUBCOMPONENTS · LEVEL 2

- dipper bucket
- boom
- crowd machinery
- crawler tracks
- dipper handle
- hoist rope & drum
- swing drive & rack

CUTAWAY REVEALS

the hoist drum and motors, crowd machinery, swing transmission, gantry sheaves and the hoist ropes routed to the dipper



DL-03

Walking Dragline

EXCAVATION & LOADING

Excavation & Loading Class 3 of 50

WHAT IT IS

Walking machine that drags a large bucket on ropes to strip overburden in surface mines.

SUBCOMPONENTS · LEVEL 2

- dragline bucket
- hoist ropes
- walking shoes (cams)
- swing & hoist machinery
- drag ropes
- boom & mast
- tub base

CUTAWAY REVEALS

the hoist and drag drums, swing motors, walking eccentric cams, dragline electrics and the rope reeving over boom sheaves



LD-04

Front-End Wheel Loader

EXCAVATION & LOADING

Excavation & Loading Class 4 of 50

WHAT IT IS

Rubber-tyred loader that scoops and carries muck or ore in a front bucket.

SUBCOMPONENTS · LEVEL 2

- bucket
- lift arms
- tilt linkage & cylinders
- articulation joint
- axles & differentials
- tyres & rims
- operator cab

CUTAWAY REVEALS

the lift and tilt cylinders, articulation pivot bearings, transmission and torque converter, drive axles and differential gears



LH-05

Underground LHD Loader

EXCAVATION & LOADING

Excavation & Loading Class 5 of 50

WHAT IT IS

Low-profile load-haul-dump machine that loads, trams and dumps ore underground.

SUBCOMPONENTS · LEVEL 2

- bucket
- boom & lift arms
- articulation frame joint
- hydraulic cylinders
- diesel/electric powertrain
- axles & wheel ends
- operator compartment

CUTAWAY REVEALS

the lift and tilt cylinders, articulation joint, powertrain and torque converter, planetary wheel ends and the hydraulic tank



CM-06

Continuous Miner

EXCAVATION & LOADING

Excavation & Loading Class 6 of 50

WHAT IT IS

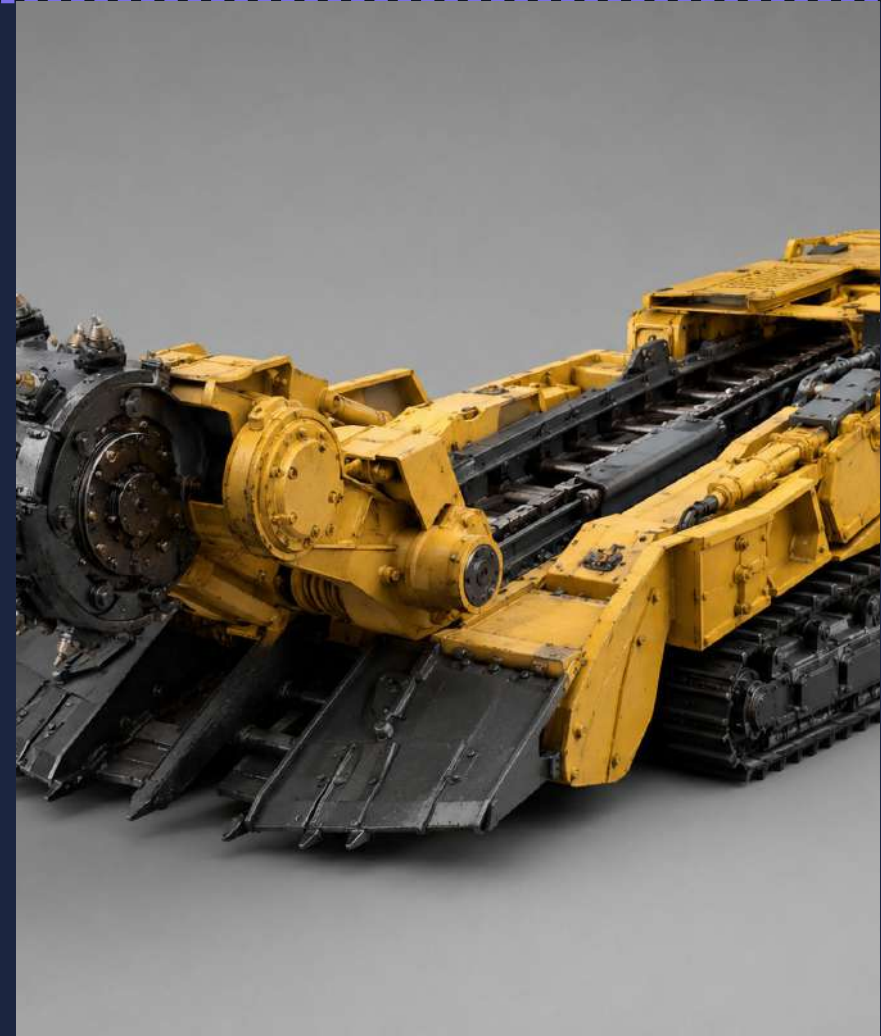
Tracked machine with a rotating drum that cuts coal or soft rock continuously.

SUBCOMPONENTS · LEVEL 2

- cutter drum & picks
- gathering arms
- crawler tracks
- stabilising jacks
- cutter head motor
- conveyor (chain conveyor)
- hydraulic system

CUTAWAY REVEALS

the cutter drum bearings and picks, cutter head gearbox, gathering-arm drives, conveyor chain and the hydraulic valve bank



TR-07

Rigid-Frame Haul Truck

HAULAGE & MOBILE SUPPORT

Haulage & Mobile Support Class 7 of 50

WHAT IT IS

Large off-highway dump truck that hauls rock from loading point to dump or crusher.

SUBCOMPONENTS · LEVEL 2

- dump body (tray)
- hoist cylinders
- wheel motors / final drives
- tyres & rims
- suspension struts
- diesel engine
- operator cab

CUTAWAY REVEALS

the hoist cylinders, electric wheel motors or mechanical final drives, suspension struts, the engine and the radiator pack



AT-08

Articulated Dump Truck

HAULAGE & MOBILE SUPPORT

Haulage & Mobile Support Class 8 of 50

WHAT IT IS

All-wheel-drive truck with a hinged frame for hauling on rough or soft ground.

SUBCOMPONENTS · LEVEL 2

- dump body
- hoist cylinders
- articulation & oscillation joint
- transmission
- drive axles
- tyres
- operator cab

CUTAWAY REVEALS

the articulation and oscillation bearings, hoist cylinders, transmission and transfer case, and the differential drive axles



UT-09

Underground Haul Truck

HAULAGE & MOBILE SUPPORT

Haulage & Mobile Support Class 9 of 50

WHAT IT IS

Low-profile articulated truck that hauls ore through underground drives and ramps.

SUBCOMPONENTS · LEVEL 2

- dump body
- hoist cylinder
- articulation joint
- powertrain & transmission
- axles & wheel ends
- tyres
- operator cab

CUTAWAY REVEALS

the hoist cylinder, articulation joint bearings, transmission and torque converter, planetary wheel ends and the brake packs



GR-10

Motor Grader

HAULAGE & MOBILE SUPPORT

Haulage & Mobile Support Class 10 of 50

WHAT IT IS

Self-propelled machine with a long blade that shapes and maintains haul roads.

SUBCOMPONENTS · LEVEL 2

- moldboard blade
- blade lift cylinders
- tandem drive axles
- operator cab
- circle & drawbar
- articulation joint
- scarifier/ripper

CUTAWAY REVEALS

the circle drive and turntable, blade lift cylinders, articulation pivot, tandem chain drives and the hydraulic valve bank



DZ-11

Track Dozer

HAULAGE & MOBILE SUPPORT

Haulage & Mobile Support Class 11 of 50

WHAT IT IS

Crawler tractor with a front blade that pushes and spreads rock and overburden.

SUBCOMPONENTS · LEVEL 2

- dozer blade
- blade lift & tilt cylinders
- push arms
- ripper (rear)
- crawler track chains
- track rollers & idlers
- final drives

CUTAWAY REVEALS

the blade lift and tilt cylinders, track final drives and sprockets, the track rollers and idlers, and the hydraulic pump



WC-12

Water Cart / Dust-Suppression Truck

HAULAGE & MOBILE SUPPORT

Haulage & Mobile Support Class 12 of 50

WHAT IT IS

Tanker truck that sprays water on haul roads to suppress dust.

SUBCOMPONENTS · LEVEL 2

- water tank
- water pump
- truck chassis
- cannon/monitor sprayer
- spray bars & nozzles
- valve & manifold
- tyres

CUTAWAY REVEALS

the water pump, internal tank baffles, the valve manifold, spray-bar piping and the hydraulic pump drive



DR-13

Top-Hammer Surface Drill Rig

DRILLING & GROUND SUPPORT

Drilling & Ground Support Class 13 of 50

WHAT IT IS

Tracked rig that drills blastholes with a percussive hammer at the rod top.

SUBCOMPONENTS · LEVEL 2

- rock drill (hammer)
- drill rods & couplings
- rotation motor
- dust collector
- feed beam
- drill bit
- tracked carrier

CUTAWAY REVEALS

the percussion piston and rotation gears inside the rock drill, the feed chain, the rod string and the flushing air passage



WHAT IT IS

Rig that drills large blastholes with a hammer running down inside the hole.

SUBCOMPONENTS · LEVEL 2

- dth hammer
- drill pipe string
- feed mast
- crawler carrier
- drill bit
- rotary head
- compressor

CUTAWAY REVEALS

the down-hole hammer piston and bit, the rotary head gears, the pipe string, the air supply line and the feed cylinder



JD-15

Underground Jumbo Drill

DRILLING & GROUND SUPPORT

Drilling & Ground Support Class 15 of 50

WHAT IT IS

Mobile rig with hydraulic booms that drills face and bolt holes underground.

SUBCOMPONENTS · LEVEL 2

- drilling booms
- rock drills (drifters)
- feed beams
- drill rods & bits
- articulated carrier
- hydraulic power pack
- operator platform

CUTAWAY REVEALS

the drifter percussion mechanism, boom pivot cylinders, feed chains, the hydraulic pump pack and the rod strings



RB-16

Roof Bolter / Rock-Bolting Rig

DRILLING & GROUND SUPPORT

Drilling & Ground Support Class 16 of 50

WHAT IT IS

Machine that drills holes and installs roof or rib bolts to support ground.

SUBCOMPONENTS · LEVEL 2

- drill head & chuck
- bolt feed/carousel
- feed beam
- boom
- hydraulic system
- resin/grout injector
- tracked or wheeled carrier

CUTAWAY REVEALS

the rotation gearbox and chuck, the feed cylinder, the bolt-handling carousel, hydraulic valves and the resin injector



RBR-17

Raise Borer

DRILLING & GROUND SUPPORT

Drilling & Ground Support Class 17 of 50

WHAT IT IS

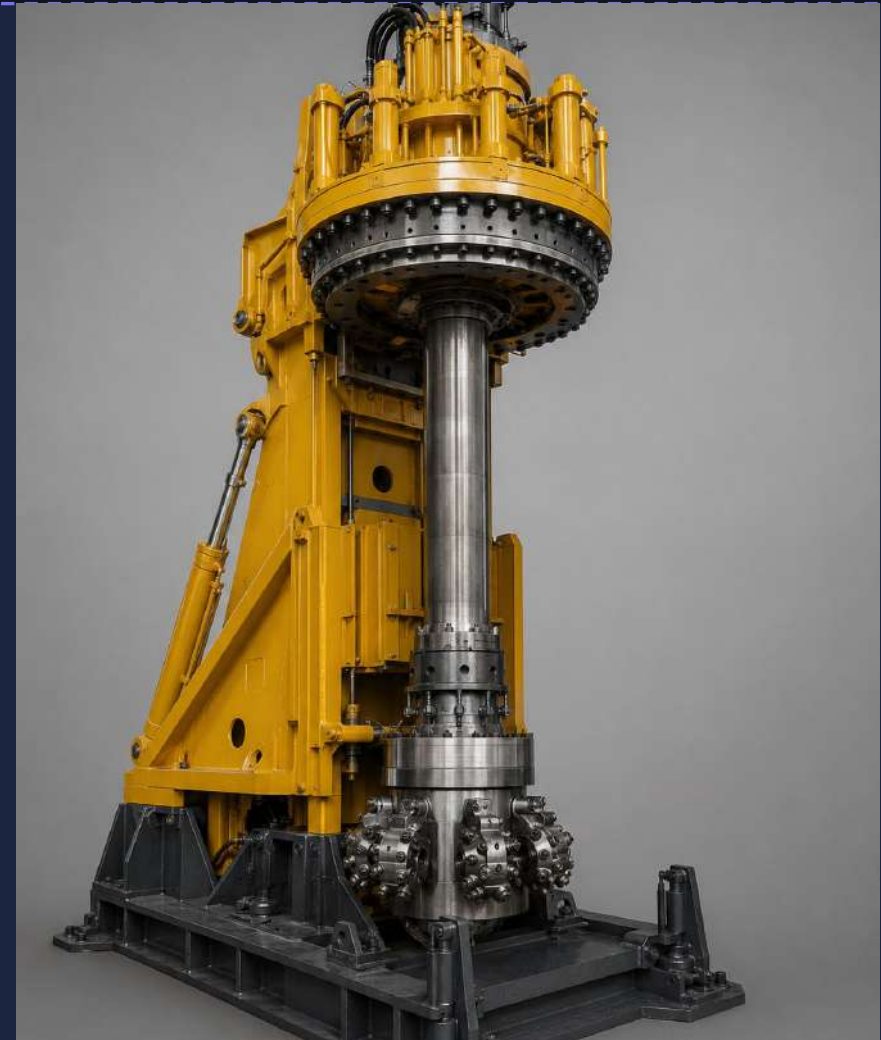
Machine that reams a large vertical shaft between levels by pulling a cutter head.

SUBCOMPONENTS · LEVEL 2

- reaming head & cutters
- rotary drive head
- gripper/clamp
- hydraulic power unit
- drill string (rods)
- thrust/pull cylinders
- pilot bit

CUTAWAY REVEALS

the main bearing and gearbox of the drive head, the thrust cylinders, the rod string and the reaming-head disc cutters



SH-18

Shotcrete Spraying Rig

DRILLING & GROUND SUPPORT

Drilling & Ground Support Class 18 of 50

WHAT IT IS

Mobile rig that sprays wet concrete onto walls and backs to support ground.

SUBCOMPONENTS · LEVEL 2

- spraying boom & nozzle
- concrete pump
- accelerator dosing pump
- agitator hopper
- hydraulic system
- compressor
- wheeled carrier

CUTAWAY REVEALS

the concrete piston pump, the boom cylinders, the accelerator dosing pump, the agitator and the hydraulic valve bank



CR-19

Primary Gyrotory Crusher

CRUSHING & COMMINUTION

Crushing & Comminution Class 19 of 50

WHAT IT IS

Large primary crusher that breaks run-of-mine rock between a gyrating cone and shell.

SUBCOMPONENTS · LEVEL 2

- mantle
- main shaft
- spider & spider cap
- hydraulic adjustment cylinder
- concave liners
- eccentric assembly
- top shell & bottom shell

CUTAWAY REVEALS

the gyrating mantle and surrounding concave liners, the main shaft, the eccentric bushing and the hydraulic support cylinder



CR-20

Jaw Crusher

CRUSHING & COMMINUTION

Crushing & Comminution Class 20 of 50

WHAT IT IS

Crusher that breaks rock by compression between a fixed and a swinging jaw.

SUBCOMPONENTS · LEVEL 2

- fixed jaw plate
- swing jaw plate
- pitman
- eccentric shaft
- toggle plate
- tension rod & spring
- flywheel

CUTAWAY REVEALS

the swing jaw and pitman, the eccentric shaft and bearings, the toggle plate seat and the tension rod and spring



CR-21

Cone Crusher

CRUSHING & COMMINUTION

Crushing & Comminution Class 21 of 50

WHAT IT IS

Secondary crusher that crushes rock between a gyrating mantle and bowl liner.

SUBCOMPONENTS · LEVEL 2

- mantle
- bowl liner (concave)
- main shaft
- eccentric bushing
- countershaft & pinion
- hydraulic adjustment ring
- head/cone assembly

CUTAWAY REVEALS

the gyrating mantle and bowl liner, the main shaft and head, the eccentric and bushings, and the countershaft pinion gear



WHAT IT IS

Twin counter-rotating toothed rolls that crush soft to medium rock and coal.

SUBCOMPONENTS · LEVEL 2

- crushing rolls & teeth
- gearboxes
- bearing assemblies
- scraper bars
- roll shafts
- drive motors
- frame & housing

CUTAWAY REVEALS

the toothed roll segments, the roll shaft bearings, the synchronising gearbox and the drive coupling



ML-23

SAG Mill

CRUSHING & COMMINUTION

Crushing & Comminution Class 23 of 50

WHAT IT IS

Large rotating drum that grinds ore with steel balls and the ore's own mass.

SUBCOMPONENTS · LEVEL 2

- mill shell
- shell & head liners
- trunnion bearings
- ring gear & pinion
- feed chute
- discharge grate
- lubrication system

CUTAWAY REVEALS

the shell and head liners, the steel grinding ball charge, the trunnion bearings, the discharge grate and the ring gear and pinion



ML-24

Ball Mill

CRUSHING & COMMINUTION

Crushing & Comminution Class 24 of 50

WHAT IT IS

Rotating cylinder that grinds ore fine using a charge of steel balls.

SUBCOMPONENTS · LEVEL 2

- mill shell
- trunnion bearings
- feed & discharge trunnions
- grinding ball charge
- rubber/steel liners
- ring gear & pinion
- grate/diaphragm

CUTAWAY REVEALS

the shell liners, the steel ball charge, the trunnion bearings, the internal diaphragm and the ring gear and pinion



GR-25

High-Pressure Grinding Roll

CRUSHING & COMMINUTION

Crushing & Comminution Class 25 of 50

WHAT IT IS

Two counter-rotating rolls that crush ore under very high pressure between them.

SUBCOMPONENTS · LEVEL 2

- fixed roll
- floating roll
- roll tyres/studs
- hydraulic pressure system
- bearing assemblies
- feed hopper & gate
- drive gearboxes

CUTAWAY REVEALS

the studded roll surfaces, the roll bearings, the hydraulic pressure cylinders and accumulators, and the drive gear reducers



FE-26

Vibrating Grizzly Feeder

MATERIAL HANDLING & CONVEYING

Material Handling & Conveying Class 26 of 50

WHAT IT IS

Vibrating pan with bar grizzly that meters run-of-mine feed and scalps fines.

SUBCOMPONENTS · LEVEL 2

- feeder pan
- vibrating exciters/motors
- liner plates
- frame
- grizzly bars
- support springs
- drive motor

CUTAWAY REVEALS

the unbalanced exciter shafts and weights, the support coil springs, the pan liner plates and the grizzly bar deck



FE-27

Apron Feeder

MATERIAL HANDLING & CONVEYING

Material Handling & Conveying Class 27 of 50

WHAT IT IS

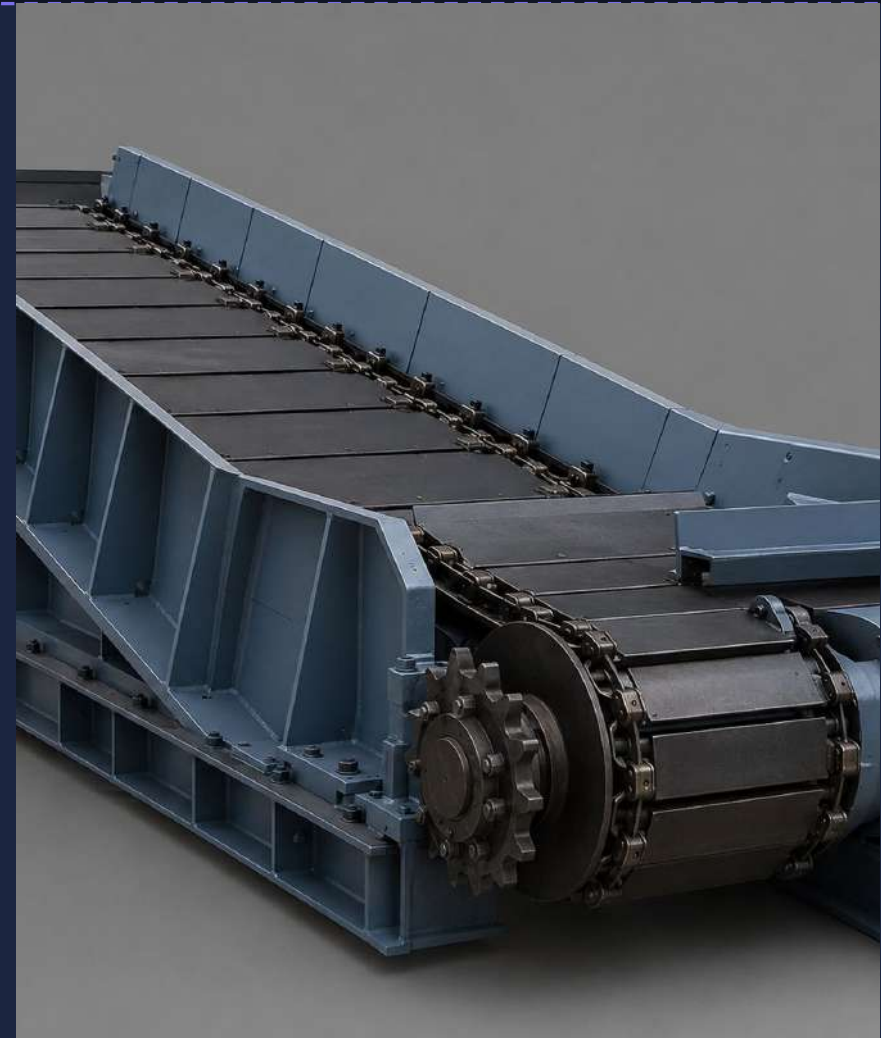
Heavy chain-and-pan conveyor that meters coarse ore out of a bin or dump pocket.

SUBCOMPONENTS · LEVEL 2

- apron pans
- drive sprockets & shaft
- track rollers
- skirt boards
- crawler chains
- tail/take-up assembly
- hydraulic/gear drive

CUTAWAY REVEALS

the apron pans bolted to crawler chain links, the drive sprockets and shaft, the support track rollers and the gear drive



CV-28

Belt Conveyor

MATERIAL HANDLING & CONVEYING

Material Handling & Conveying Class 28 of 50

WHAT IT IS

Endless rubber belt on idlers that carries ore between plant areas.

SUBCOMPONENTS · LEVEL 2

- conveyor belt
- drive pulley
- tail & bend pulleys
- idler rollers
- drive motor & gearbox
- take-up unit
- structure & frame

CUTAWAY REVEALS

the head drive pulley and lagging, the gear reducer, the troughing and return idlers, the belt carcass plies and the take-up weight



SR-29

Stacker / Reclaimer

MATERIAL HANDLING & CONVEYING

Material Handling & Conveying Class 29 of 50

WHAT IT IS

Rail-mounted boom machine that builds and reclaims ore stockpiles.

SUBCOMPONENTS · LEVEL 2

- boom conveyor
- bucket wheel
- slew bearing
- luffing cylinders/winch
- travel bogies & rails
- counterweight
- drive motors

CUTAWAY REVEALS

the bucket-wheel drive and buckets, the boom conveyor pulleys, the slew bearing and drive, and the travel bogie wheels



SC-30

Vibrating Screen

MATERIAL HANDLING & CONVEYING

Material Handling & Conveying Class 30 of 50

WHAT IT IS

Inclined or horizontal vibrating deck that separates material by size.

SUBCOMPONENTS · LEVEL 2

- screen decks
- screen media (panels)
- exciter / vibrator motors
- support springs
- side plates
- feed & discharge boxes
- cross beams

CUTAWAY REVEALS

the exciter shaft and unbalanced weights, the support coil springs, the deck cross beams and the layered screen media



FL-31

Flotation Cell

SEPARATION & CONCENTRATION

Separation & Concentration Class 31 of 50

WHAT IT IS

Aerated tank where reagents and bubbles float valuable minerals off as froth.

SUBCOMPONENTS · LEVEL 2

- tank/cell body
- stator
- air sparging system
- level control dart valve
- rotor (impeller)
- launder & froth lip
- drive motor & shaft

CUTAWAY REVEALS

the rotor and stator at the cell bottom, the air sparge ring, the draft tube, the launder weir and the dart level valve



TH-32

Thickener

SEPARATION & CONCENTRATION

Separation & Concentration Class 32 of 50

WHAT IT IS

Large settling tank with a slow rake that concentrates solids into a dense underflow.

SUBCOMPONENTS · LEVEL 2

- tank
- rake arms & blades
- centre drive head
- feedwell
- overflow launder
- underflow cone & outlet
- lifting mechanism

CUTAWAY REVEALS

the centre drive gear and bearing, the rake arms and blades, the feedwell, the sloped floor and the underflow cone



CY-33

Hydrocyclone

SEPARATION & CONCENTRATION

Separation & Concentration Class 33 of 50

WHAT IT IS

Conical vessel that uses centrifugal swirl to split slurry by particle size.

SUBCOMPONENTS · LEVEL 2

- cylindrical feed chamber
- vortex finder
- feed inlet
- wear liners
- conical section
- spigot (apex)
- overflow outlet

CUTAWAY REVEALS

the involute feed entry, the vortex finder tube, the conical wear liners, the spinning slurry path and the apex spigot



MS-34

Magnetic Separator (Drum)

SEPARATION & CONCENTRATION

Separation & Concentration Class 34 of 50

WHAT IT IS

Rotating magnetic drum that pulls magnetic minerals out of a slurry or feed stream.

SUBCOMPONENTS · LEVEL 2

- magnetic drum
- drum shell
- tank/trough
- scraper/discharge
- stationary magnet array
- drive motor
- feed box

CUTAWAY REVEALS

the stationary internal magnet assembly, the rotating drum shell, the tank weirs and the bearing and drive shaft



SP-35

Spiral Concentrator

SEPARATION & CONCENTRATION

Separation & Concentration Class 35 of 50

WHAT IT IS

Helical chute that separates minerals by density as slurry spirals down.

SUBCOMPONENTS · LEVEL 2

- helical trough
- support column
- feed distributor
- product splitters
- wash-water ports
- launder/collection box
- wear surface

CUTAWAY REVEALS

the helical flow channel cross-section, the product splitter cutters, the wash-water ports and the central support column



FP-36

Plate-and-Frame Filter Press

SEPARATION & CONCENTRATION

Separation & Concentration Class 36 of 50

WHAT IT IS

Stack of plates that squeezes slurry into dry filter cake and clear filtrate.

SUBCOMPONENTS · LEVEL 2

- filter plates
- filter cloths
- hydraulic closing cylinder
- head & follower plates
- side bars
- feed manifold
- drip tray

CUTAWAY REVEALS

the recessed plate chambers, the filter cloths, the feed and filtrate channels and the hydraulic closing cylinder



Centrifugal Slurry Pump

Slurry & Process Pumping Class 37 of 50

WHAT IT IS

Heavy-duty centrifugal pump that moves abrasive slurry with a lined impeller and casing.

SUBCOMPONENTS · LEVEL 2

- impeller
- shaft
- mechanical/gland seal
- suction & discharge nozzles
- volute casing & liners
- bearing assembly
- throatbush & frame plate liner

CUTAWAY REVEALS

the lined impeller and volute, the throatbush and frame-plate liner, the shaft, the bearings and the shaft seal



WHAT IT IS

Vertical pump set in a sump that handles aerated froth and floor spillage slurry.

SUBCOMPONENTS · LEVEL 2

- impeller
- casing
- column pipe & shaft
- line bearings
- sump/tank
- drive motor
- strainer/inlet

CUTAWAY REVEALS

the submerged impeller and casing, the column shaft and line bearings, the froth tank and the top thrust bearing



WHAT IT IS

Pump that meters thick or abrasive slurry by squeezing a hose with rollers.

SUBCOMPONENTS · LEVEL 2

- hose/tube element
- pump housing
- lubricant fill
- leak detector
- rotor & shoes (rollers)
- gearbox & motor
- suction & discharge ports

CUTAWAY REVEALS

the reinforced hose, the roller rotor and shoes, the lubricant-filled housing and the gear reducer



P-40

Process Water Pump

SLURRY & PROCESS PUMPING

Slurry & Process Pumping Class 40 of 50

WHAT IT IS

Adds energy to clean water via a spinning impeller; casing holds pressure after stop.

SUBCOMPONENTS · LEVEL 2

- impeller
- shaft
- mechanical seal
- discharge nozzle
- volute casing
- bearing housing
- suction nozzle

CUTAWAY REVEALS

the impeller vanes inside the volute, the shaft, the mechanical seal, the wear rings and the bearings



FN-41

Primary Ventilation Fan

FIXED PLANT & UTILITIES

Fixed Plant & Utilities Class 41 of 50

WHAT IT IS

Large axial fan that pushes or pulls air through the underground mine.

SUBCOMPONENTS · LEVEL 2

- impeller/rotor blades
- fan casing
- drive motor
- main bearings
- inlet cone & guide vanes
- damper/diffuser
- drive shaft & coupling

CUTAWAY REVEALS

the rotor blades on the hub, the main bearings, the guide vanes, the drive shaft coupling and the diffuser



AC-42

Industrial Air Compressor

FIXED PLANT & UTILITIES

Fixed Plant & Utilities Class 42 of 50

WHAT IT IS

Machine that compresses air to drive pneumatic tools and plant instruments.

SUBCOMPONENTS · LEVEL 2

- airend (screw element)
- oil separator tank
- inlet valve & filter
- control panel
- drive motor
- air/oil cooler
- minimum-pressure valve

CUTAWAY REVEALS

the meshing screw rotors in the airend, the oil separator element, the cooler core and the inlet valve



HPU-43

Hydraulic Power Unit

FIXED PLANT & UTILITIES

Fixed Plant & Utilities Class 43 of 50

WHAT IT IS

Skid that supplies pressurised hydraulic oil to plant actuators and clamps.

SUBCOMPONENTS · LEVEL 2

- hydraulic pump
- electric motor
- oil reservoir
- valve manifold
- filters
- accumulator
- cooler

CUTAWAY REVEALS

the pump and motor coupling, the reservoir baffles and suction strainer, the valve manifold spools and the accumulator bladder



CN-44

Overhead Bridge Crane

FIXED PLANT & UTILITIES

Fixed Plant & Utilities Class 44 of 50

WHAT IT IS

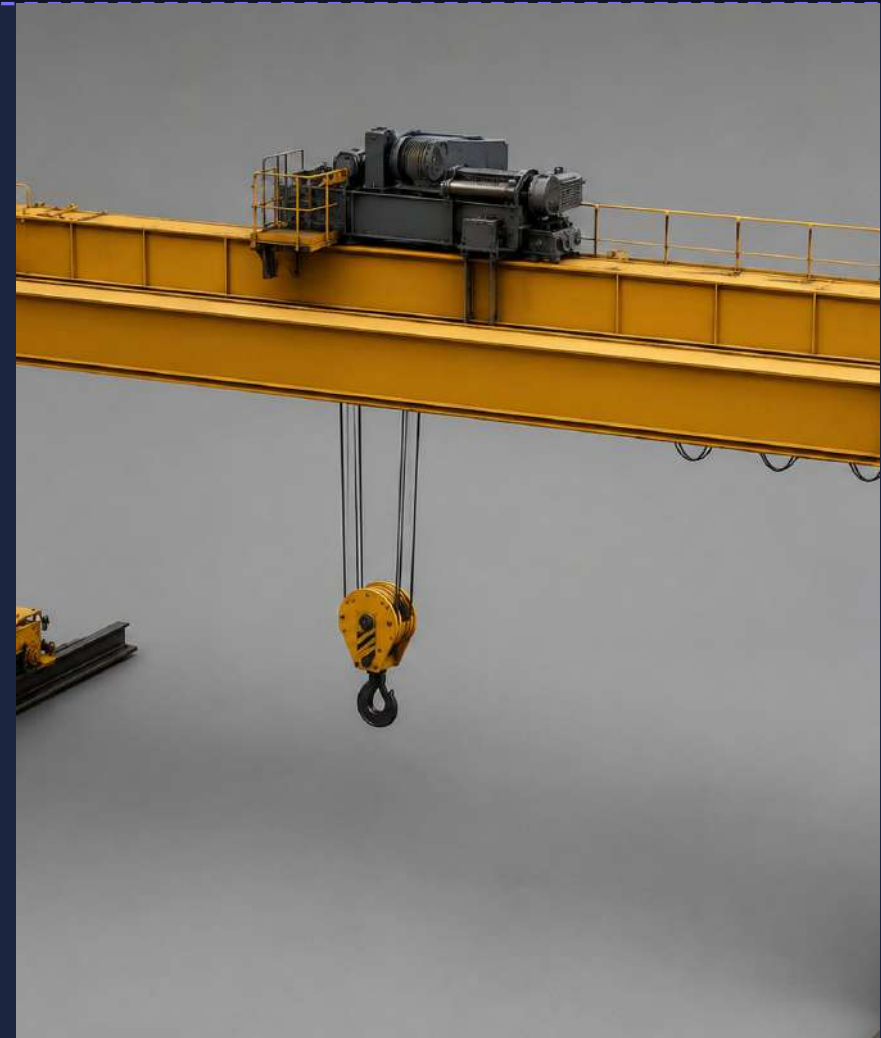
Travelling bridge crane that lifts and moves heavy plant components for maintenance.

SUBCOMPONENTS · LEVEL 2

- bridge girders
- hoist & drum
- trolley
- wire rope & hook block
- long-travel end trucks
- drive motors
- festoon/cable system

CUTAWAY REVEALS

the hoist drum and gearbox, the wire rope reeving, the trolley wheels, the bridge drive motors and the brake



SW-45

Medium-Voltage Switchgear

ELECTRICAL & ISOLATION

Electrical & Isolation Class 45 of 50

WHAT IT IS

Metal-clad cubicles that switch and protect medium-voltage power to the plant.

SUBCOMPONENTS · LEVEL 2

- circuit breaker (vacuum)
- protection relays
- racking mechanism
- cable termination chamber
- busbars
- current/voltage transformers
- earthing switch

CUTAWAY REVEALS

the withdrawable vacuum breaker, the copper busbars, the current transformers, the earthing switch and the racking mechanism



MCC-46

Motor Control Centre

ELECTRICAL & ISOLATION

Electrical & Isolation Class 46 of 50

WHAT IT IS

Cabinet lineup of starters and breakers that control and protect plant motors.

SUBCOMPONENTS · LEVEL 2

- draw-out starter buckets
- overload relays
- vertical & horizontal busbars
- incomer section
- contactors
- molded-case breakers
- control transformers

CUTAWAY REVEALS

the plug-in starter buckets with contactors and overloads, the vertical and horizontal busbars and the control wiring



TX-47

Distribution Power Transformer

ELECTRICAL & ISOLATION

Electrical & Isolation Class 47 of 50

WHAT IT IS

Steps voltage up or down between supply and plant distribution networks.

SUBCOMPONENTS · LEVEL 2

- core & windings
- bushings (HV/LV)
- conservator / oil expansion
- buchholz & protection devices
- tank
- tap changer
- radiators/cooling fins

CUTAWAY REVEALS

the laminated core and copper windings immersed in oil, the tap changer, the bushings and the cooling oil circuit



IS-48

Field Isolator / Disconnect Switch

ELECTRICAL & ISOLATION

Electrical & Isolation Class 48 of 50

WHAT IT IS

Lockable switch at equipment that isolates power for safe maintenance.

SUBCOMPONENTS · LEVEL 2

- switch contacts
- lock-off hasp
- incoming/outgoing terminals
- earth terminal
- operating handle
- enclosure
- auxiliary contacts

CUTAWAY REVEALS

the load-break contacts, the operating shaft and spring, the terminal connections and the auxiliary contact block



VSD-49

Variable-Speed Drive (VSD/VFD)

ELECTRICAL & ISOLATION

Electrical & Isolation Class 49 of 50

WHAT IT IS

Power electronics cabinet that varies motor speed by changing supply frequency.

SUBCOMPONENTS · LEVEL 2

- rectifier section
- igbt inverter modules
- control board
- line filter
- dc bus capacitors
- cooling fans / heatsink
- input/output reactors

CUTAWAY REVEALS

the rectifier diodes, the DC bus capacitor bank, the IGBT inverter modules, the heatsink and the control board



WT-50

Conveyor Belt Weightometer

INSTRUMENTS & MONITORING

Instruments & Monitoring Class 50 of 50

WHAT IT IS

In-line scale that weighs ore on a conveyor to measure tonnage flow rate.

SUBCOMPONENTS · LEVEL 2

- weigh idler frame
- speed sensor (tacho)
- calibration weights
- mounting frame
- load cells
- integrator/controller
- junction box

CUTAWAY REVEALS

the load cells under the weigh-idler frame, the pivot flexures, the speed sensor wheel and the signal junction box



THE MINING LIVING LIBRARY, BUILT

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